

WHAT IS CLAIMED IS:

1. An optical scanning apparatus in which a light beam from a light source is deflected and forms an imaging spot on a surface to be scanned,  
5 said apparatus comprising:

said light source having a wavelength of 500 nm or less; and

a reflecting mirror which reflects the light beam from said light source,

10 wherein if a complex refractive index  $N$  of a metallic film contributing to a reflection characteristic of said reflecting mirror is defined as

$$N(\lambda) = n(\lambda) - ik(\lambda)$$

15 where  $n, k > 0$ ;

$n(\lambda)$  is the real part of the complex refractive index;

$$i = \sqrt{-1};$$

$k(\lambda)$  is the imaginary part of the complex  
20 refractive index (exhaustion factor); and

$\lambda$  is the wavelength, then the reflecting mirror satisfies a condition:  $k(\lambda) > \sqrt{-n(\lambda)^2 + 18n(\lambda) - 1}$ .

2. An optical scanning apparatus according to  
25 claim 1, wherein alumina ( $Al_2O_3$ ) is added on the metallic film contributing to the reflection characteristic of said reflecting mirror.

3. An optical scanning apparatus according to claim 1, wherein a dielectric film is further added on said reflecting mirror.

5        4. An optical scanning apparatus according to claim 1, wherein said reflecting mirror comprises a deflecting mirror for deflecting the light beam from the light source to perform scanning.

10       5. An optical scanning apparatus according to claim 4, wherein the metallic film contributing to the reflection characteristic of said reflecting mirror of said deflecting mirror and a base member of said deflecting mirror are formed  
15 from the same metallic material.

6. An optical scanning apparatus according to claim 4, wherein said deflecting mirror comprises a rotary polygon mirror.

20       7. An optical scanning apparatus according to claim 1, wherein said reflecting mirror comprises a bending mirror for bending the optical path of the light beam from the light source in a  
25 predetermined direction.

8. An optical scanning apparatus according to

claim 1, wherein said reflecting mirror comprises a scanning and imaging mirror having a condensing effect.

5           9. An optical scanning apparatus according to claim 1, wherein the metallic film contributing to the reflection characteristic of said reflecting mirror comprises aluminum.

10           10. An optical scanning apparatus according to claim 1, wherein the metallic film contributing to the reflection characteristic of said reflecting mirror comprises silver.

15           11. An optical scanning apparatus according to claim 1, wherein said light source comprises a gallium nitride blue-violet semiconductor laser.

20           12. An optical scanning apparatus according to claim 1, further comprising a scanning and imaging lens system for forming the imaging spot on the surface to be scanned with the light beam from said light source,

              wherein said scanning and imaging lens system  
25 has at least one plastic lens; and if the maximum and the minimum of the total ray passage distance of said plastic lens according to the deflection

angle from the optical axis is  $L_{\max}$  and  $L_{\min}$ , respectively, then  $L_{\max} - L_{\min} < 3 \cdot \log_{10} 0.93/S$ , and  $S = \log_{10}(1 - 3.55 \times 10^8/\lambda^4)$ , where  $\lambda$  is the wavelength (nm) of the light beam.

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13. An optical scanning apparatus according to claim 1, further comprising a scanning and imaging lens system for forming the imaging spot on the surface to be scanned with the light beam from said light source, said scanning and imaging lens system having at least one plastic lens, and an optical member having a spectral characteristic similar to the inverse of a wavelength characteristic of the transmittance of an optical resin used for said plastic lens.

14. An image forming apparatus comprising an optical scanning apparatus according to any one of claims 1 to 13, a photosensitive member disposed at a surface to be scanned of said optical scanning apparatus, a development device which develops as a toner image an electrostatic latent image formed on said photosensitive member by a beam of light moved in a scanning manner by said optical scanning apparatus, a transfer device which transfers the developed toner image onto a transfer member, and a fixation device which fixes

the transferred toner image on the transfer member.

15. An image forming apparatus according to claim 14, further comprising a printer controller  
5 which converts code data input from an external device into an image signal and inputs the image signal to said optical scanning apparatus.

16. An optical scanning apparatus comprising  
10 a deflection optical system which deflects a light beam from a light source, and a scanning and imaging lens system which forms an imaging spot on a surface to be scanned with the light beam from said deflection optical system,

15 wherein the wavelength of the light source is 500 nm or less, and

wherein said scanning and imaging lens system has at least one plastic lens; and if the maximum and the minimum of the total ray passage distance  
20 of said plastic lens according to the deflection angle from the optical axis is  $L_{\max}$  and  $L_{\min}$ , respectively, then  $L_{\max} - L_{\min} < 3 \cdot \log_{10} 0.93/S$ , and  $S = \log_{10}(1 - 3.55 \times 10^8/\lambda^4)$ , where  $\lambda$  is the wavelength (nm) of the light beam.

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17. An optical scanning apparatus according to claim 16, wherein a correction member for

correcting light quantity distribution  
nonuniformity on the surface to be scanned is  
provided between said deflection optical system  
and the surface to be scanned.

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18. An optical scanning apparatus according  
to claim 17, wherein said correction member  
comprises a reflecting mirror whose reflectance  
changes according to the incident angle.

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19. An optical scanning apparatus according  
to claim 17, wherein said correction member  
comprises a filter whose transmittance changes  
according to the distance from the optical axis.

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20. An optical scanning apparatus according  
to claim 17, wherein said correction member  
comprises an optical thin film whose transmittance  
changes according to the distance from the optical  
axis.

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21. An optical scanning apparatus according  
to any one of claims 16 to 20, wherein light  
quantity distribution nonuniformity of the light  
beam on the surface scanned with the light beam by  
said scanning and imaging lens system is 7% or  
less.

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22. An optical scanning apparatus comprising a deflection optical system which deflects a light beam from a light source, and a scanning and imaging lens system which forms an imaging spot on  
5 a surface to be scanned with the light beam from said deflection optical system,

wherein the wavelength of the light source is 500 nm or less, and

wherein said scanning and imaging lens system  
10 has at least one plastic lens, and an optical member having a spectral characteristic similar to the inverse of a wavelength characteristic of the transmittance of an optical resin used for said plastic lens.

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23. An optical scanning apparatus according to claim 22, wherein said optical member comprises a reflecting mirror.

20 24. An optical scanning apparatus according to claim 22, wherein said optical member comprises a filter.

25 25. An optical scanning apparatus according to claim 22, wherein said optical member comprises an optical thin film.

26. An optical scanning apparatus according to any one of claims 22 to 25, wherein said light source comprises a gallium nitride blue-violet semiconductor laser.

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27. An optical scanning apparatus according to claim 22, wherein said scanning and imaging lens system has at least one plastic lens; and if the maximum and the minimum of the total ray  
10 passage distance of said plastic lens according to the deflection angle from the optical axis is  $L_{\max}$  and  $L_{\min}$ , respectively, then  $L_{\max} - L_{\min} < 10 \text{ mm}$  is satisfied.

15 28. An image forming apparatus comprising an optical scanning apparatus according to any one of claims 16 to 20, 22 to 25 or 27;

a photosensitive member disposed at a surface to be scanned of said optical scanning apparatus;

20 a development device which develops as a toner image an electrostatic latent image formed on said photosensitive member by a beam of light moved in a scanning manner by said optical scanning apparatus;

25 a transfer device which transfers the developed toner image onto a transfer member; and a fixation device which fixes the transferred



toner image on the transfer member.

29. An image forming apparatus comprising an optical scanning apparatus according to claim 21;  
5 a photosensitive member disposed at a surface to be scanned of said optical scanning apparatus;  
a development device which develops as a toner image an electrostatic latent image formed on said photosensitive member by a beam of light  
10 moved in a scanning manner by said optical scanning apparatus;  
a transfer device which transfers the developed toner image onto a transfer member; and  
a fixation device which fixes the transferred  
15 toner image on the transfer member.

30. An image forming apparatus comprising an optical scanning apparatus according to claim 26;  
a photosensitive member disposed at a surface  
20 to be scanned of said optical scanning apparatus;  
a development device which develops as a toner image an electrostatic latent image formed on said photosensitive member by a beam of light moved in a scanning manner by said optical  
25 scanning apparatus;  
a transfer device which transfers the developed toner image onto a transfer member; and

a fixation device which fixes the transferred toner image on the transfer member.

31. An image forming apparatus according to  
5 claim 28, further comprising a printer controller which converts code data input from an external device into an image signal and inputs the image signal to said optical scanning apparatus.

10 32. An image forming apparatus according to claim 29, further comprising a printer controller which converts code data input from an external device into an image signal and inputs the image signal to said optical scanning apparatus.

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33. An image forming apparatus according to claim 30, further comprising a printer controller which converts code data input from an external device into an image signal and inputs the image  
20 signal to said optical scanning apparatus.